cogent ·· psychology

LARS Research Institute, Inc.
www.larsri.org

Sex Knowledge and Attitude Test for Adolescents (SKAT-A)

Fullard, Lief, & Scheier (2005)©

HEALTH PSYCHOLOGY | RESEARCH ARTICLE

Psychometric validation of the Sexual Knowledge and Attitudes Test –Adolescents (SKAT-A) in an Iranian sample

Mahsa Motedayen, Seyed Mohammad Kalantarkousheh, Lawrence M. Scheier and Martin Komarc

cogent ·· oa

cogent psychology

*Corresponding author: Lawrence M. Scheier, LARS Research Institute, Visiting Scholar, UNC Greensboro, Department of Public Health Education, Senior Research Scientist, Prevention Strategies, LLC, Scottsdale, AZ, USA
E-mail: scheier@larsri.org

Reviewing editor:
Lucia Monacis, Universita degli Studi di Foggia, Italy

Additional information is available at the end of the article

HEALTH PSYCHOLOGY | RESEARCH ARTICLE

Psychometric validation of the Sexual Knowledge and Attitudes Test –Adolescents (SKAT-A) in an Iranian sample

Mahsa Motedayen[1], Seyed Mohammad Kalantarkousheh[2], Lawrence M. Scheier[3]* and Martin Komarc[4]

Abstract: A rise in sexually transmitted diseases and liberalization of sexual attitudes has encouraged several Islamic countries to actively pursue sexual education programs. Support for this effort requires psychometrically sound instruments that can be used to assess sexual attitudes and obtain a richer understanding of the relations between attitudes and behavior. To address this knowledge gap, we translated the Sexual Knowledge and Attitudes Test—Adolescents (SKAT-A) from English to Farsi. We then examined the instrument's factorial structure and criterion validity using exploratory structural equation modeling (ESEM) with a sample of adolescent and young adult Iranians. A six-factor model fit well including constructs assessing premarital sexuality, masturbation, homosexuality, pornography, abortion, and sexual coercion. All scales had adequate

ABOUT THE AUTHORS

Lawrence M. Scheier

Mahsa Motedayen has a Master's Degree in Family Counseling. She provides clinical treatment and conducts research on sexual problems and personal issues with adolescents and adult populations.

Seyed Mohammad Kalantarkousheh is an Assistant Professor of Counseling, Faculty of Psychology and Educational Studies, Allameh Tabataba'i University. His private practice and research examine the integration of Family Counseling and Existential Thought based on Postmodern Epistemology.

Lawrence M. Scheier has a Ph.D. in Educational Psychology and Technology (1988) from the University of Southern California. His current work entails developing eHealth behavioral interventions targeting youth and young adults, psychometrics, and statistical modeling of longitudinal data. He is President of LARS Research Institute and Senior Research Scientist at Prevention Strategies.

Martin Komarc has a Ph.D. (2017) in Physical Education and Sport from Charles University in Prague, Czech Republic. His research at the Institute of Biophysics and Informatics 1st Faculty of Medicine, Charles University in Prague involves latent variable modeling and computer adaptive testing in the fields of education, psychology, and medicine.

PUBLIC INTEREST STATEMENT

Sexual activity prior to marriage is traditionally taboo in most Muslim countries, which hold dear the Quran's teachings as an integral part of daily life. Recently, Iran expanded their public health initiatives to incorporate sexual education targeting youth as part of an effort to address the rising rates of STDs, HIV transmission and pregnancy prior to marriage. An important part of these efforts involves assessing sexual attitudes and their relations to behavior. However, to date, no valid instrument has been created to monitor sexual attitudes suitable Iran's Muslim culture. We translated the Sexual Knowledge and Attitudes Test-Adolescents from English to Farsi and tested its factorial structure in a sample of youth and youth adults. We also tested subgroup differences in factor structure based on gender, age, and religious beliefs. Overall, the obtained factor structure replicated the US data with slight differences in factor composition. Attitudes were moderately related to behavior showing promise for educational courses reinforcing conservative abstinence-based values.

cogent oa

internal consistencies ranging from .66 to .85. There was sufficient evidence supporting several different forms of measurement equivalence based on gender, age and religious participation. Associations between sexual attitudes and markers of sexual activity were moderate and in the expected directions. Total replication of the U.S. factor structure was not obtained, however, there is evidence that core constructs in the instrument assessing sexual attitudes are suitable for use in a wide range of cultures, even those predicated on a strong religious beliefs system.

Subjects: Health Psychology; Psychological Methods & Statistics; Development Studies; Health & Development;

Keywords: sexual attitudes; sexual behavior; factorial validity; ESEM; cultural beliefs; Iran

1. Introduction

The Islamic Republic of Iran holds very dear the Quran's religious teachings regarding the role of family and sexuality. In this regard, research examining sexual attitudes and behavior has to address the cultural sensitivities perpetuated by the Shi'a Islam clerics and the strict rules against premarital sex (Tabatabaie, 2015). Indeed, the Islamic religion strictly forbids premarital sexual relations and sexual intercourse without a valid marriage (Doi, 1984/1404). Individuals who engage in sexual behaviors before marriage face the specter of familial and social stigma. Recently, several Muslim countries, including Iran, have become more open to addressing sexual education as part of a public health initiative (Faghihi, Shokouhi Yekta, & Parand, 2008). This has brought into sharper focus the role of sexual attitudes, values, and behavior particularly in youthful populations (Tabatabaie, 2015; Yazdi, Aschbacher, Arvantaj et al., 2006). The emphasis on learning more about sexual attitudes is fortuitous as Muslim-oriented cultures like Iran are also experiencing increasing rates of unwanted teen pregnancy and sexually transmitted diseases, the latter including human immunodeficiency virus/acquired immunodeficiency disease syndrome (HIV/AIDS: Mohammad et al., 2007). Greater awareness of the pivotal role of sexual attitudes in sexual activity is required in order to develop effective public health policies targeting transmission of these diseases.

1.1. Studies of sexuality in the Islamic Republic of Iran

Iranian studies of sexual attitudes and behavior have examined high-risk samples (Mohammad et al., 2007), young adults (Honarvar et al., 2016), college youth (Khalaj, Farahani, Cleland, & Mehryar, 2011; Simbar, Tehrani, & Hasehmi, 2005), and adolescents (Malek, Shokoohi, Faghihi, Bina, & Shafiee-Kandjani, 2010; Mohammadi et al., 2006; Tehrani & Malek-Afzali, 2008). Mohammadi et al. (2006) reported that male adolescents held relatively liberal sexual attitudes with almost one-fifth of their sample rating themselves as unreligious. Relative to other published studies, the sample reported higher rates of sexual activity; however, many youth possessed serious misconceptions about sexuality including sexually transmitted infections, AIDS, condom use and reproductive physiology (i.e., menstrual cycle). As expected, religiosity was protective and associated with less permissive sexual attitudes. Access to the Internet or satellite television, use of cigarettes, alcohol, or drugs were all associated with more permissive sexual attitudes. Slightly more than a quarter of the sample had experienced sexual "contact" and among these individuals, those reporting lower religiosity were more likely to report having sexual experiences in the absence of marriage.

Honarvar et al. (2016) conducted a population-based study with single young adults from Shiraz, a provincial city located in southern Iran. The authors reported that a little over a third of the sample found premarital sex acceptable and slightly under 50% had experienced premarital sex (42% of these experiences were heterosexual). Levels of knowledge regarding HIV/AIDs symptoms, methods of viral transmission (vaginal vs. anal sex), and prevention methods (i.e., condoms) were relatively low. A multivariate analysis showed that alcohol and (lack of) religious beliefs were both

significantly related to favoring premarital sex. Khalaj et al. (2011) examined premarital hetero-sexual relations in a representative sample of single women attending university in Tehran. The authors suggest that various changes in the context of family and liberalizing of sexual relations in Iran are fomenting a cultural shift toward permissiveness and sexual exploration. About half of the sample reported they had a boyfriend, but only 10% of the women acknowledge having inter-course, with 23% admitting "some sexual contact." More liberal family values was associated with greater likelihood of having a boyfriend or engaging in premarital sex.

Simbar et al. (2005) assessed knowledge, attitudes, and behavior among medical, science, and engineering students attending an Iranian university. The authors reported that, excluding medical students (who were not cleared to answer questions about sexual activity), a small percent (8%) acknowledged having intercourse before marriage with a huge discrepancy in the number of males (16%) versus females (0.6%) reporting intercourse. Consistent with other Iranian studies, knowl-edge of reproductive sexuality was apparently absent with 75% of the sample believing that HIV prevention methods should include applying moral principles, <50% using condoms and 17% stating that abstinence is a viable prevention method. The sample moderately endorsed that contraceptives should be made available to youth, a need for sexual education, and disagreement with withholding information from youth as a form of prevention, that sex education stimulates high-risk behavior, and the sample was relatively split evenly regarding the importance of contra-ceptives and its availability to youth.

1.2. Outstanding issues and concerns

The work that has been done so far provides a basic understanding of sexual attitudes and sexuality in Iran. Notwithstanding, there remain several concerns that need to be addressed. First, many of the scales used to assess sexual attitudes were not validated prior to their use with Muslim samples. In some cases, qualitative pilot work with focus groups or expert review was conducted to establish the item's face validity, however, rigorous psychometric testing was absent. Second, many of the scales used contained very limited content assessing sexual attitudes (e.g., Mohammad et al., 2007) or behavior, given deference for the conservative, if not secular, nature of the samples. Third, the nature of sampling varied considerably between studies, with some studies examining sexual attitudes and behavior in females only (Khalaj et al., 2011; Mosavi, Babazadeh, Najmabadi, & Shariati, 2014), males only (Mohammad et al., 2007; Mohammadi et al., 2006), high-risk samples (Tehrani & Malek-Afzali, 2008), or Muslim youth residing in westernized European countries, which may not be representative of the larger Muslim population (Smerecnik, Schaalma, Gergo, Meijer, & Poelman, 2010). In some cases, very young participants (<20 years of age) were not allowed to answer questions about sexual activity (Tehrani & Malek-Afzali, 2008). Moreover, in some cases, participants had very limited sexual experiences with only a handful reporting sexual intercourse or physical contact that extends beyond what is frequently termed touching, fondling or "petting." The low base rates of sexual behavior can restrict variances and bias estimates of factor loadings and correlations (Kline, 1994). Taken together, the tremendous heterogeneity in sampling strategies, the inconclusive nature of questionnaire procedures, and the very limited range of sexual behaviors assessed may leave us with an incomplete understanding regarding both the structure of sexual attitudes and also their relations to behavior.

2. Focus of the present study

The present study addresses these and other gaps in the literature by developing and testing a psychometrically refined measure of sexual attitudes and behavior for use with Iranian samples. We first translated the English version of the SKAT-A to Farsi using standard translation procedures (Harkness, Van De Vijver, & Mohler, 2003). This process involves several concerted steps, which we outline below. We then assessed the factorial validity of the newly translated instrument using exploratory structural equation modeling (ESEM) techniques. Recent work has eteablished the methodological advantages to using ESEM compared to exploratory (EFA) or confirmatory (CFA) factor analysis (Asparouhov & Muthén, 2009; Marsh et al., 2009). In the case of CFA, the heavy restriction imposed through simple structure (items can only load on one factor >0) spuriously

inflates correlations between factors (Marsh, Liem, Martin, Morin, & Nagengast, 2011). The over-estimation of zero-order relations leads to greater Type I errors (rejecting the null that a factor-to-factor correlation is not different from zero). In contrast, ESEM does not require simple structure (allowing loadings >0 on nontarget factors) resulting in a more veridical interpretation of factor correlations and factor loadings. There is now a growing body of literature that demonstrates the power and flexibility of ESEM compared to CFA including studies of physical self-concept in youth (Morin & Maïano, 2011), self-concept in children (Morin, Ahrens, & Marsh, 2016), and personality in German secondary school students (Marsh et al., 2010). In all cases ESEM outperformed the CFA producing better fit and clearer substantive interpretations for multidimensional constructs.

In addition, when compared to EFA, ESEM provides a statistical means to test model invariance using multiple group comparisons with appropriate parameter constraints.[1] Following accepted conventions for testing measurement invariance (e.g., Dimitrov, 2010), we examined model equivalence across demographic subgroups of gender, age and also religious commitment levels (i.e., attending religious functions). All three of these sample characteristics have been tied to observed subgroup differences in sexual attitudes. We then validated the newly constructed instrument using several common behavioral markers of sexual activity. Collectively, these different strategies should yield preliminary information on the suitability of the SKAT-A for the Iranian culture.

3. Method

3.1. Development of the SKAT-A
The Sexual Knowledge and Attitudes Test—Adolescents (SKAT-A) is a self-report instrument developed to assess sexual knowledge, attitudes, and behaviors. The SKAT was first developed using samples of graduate, medical, and nursing students (e.g., Miller & Lief, 1976, 1979). Initial factor analysis using principal components analysis with varimax rotation produced a four-factor model including heterosexual relations, sexual myths (masturbation, pornography, and homosexuality), autoeroticism, and abortion. The instrument was then extensively refined (Fullard, Johnston, & Lief, 1998), and further validated with US adolescents as the SKAT-A (Fullard & Scheier, 2010; Lief, Fullard, & Devlin, 1990). Fullard et al. (1998) reported adequate internal consistency estimates for five subscales including masturbation (α = .87), homosexuality (α = .83), pornography (α = .73), premarital sex (α = .77), and abortion (α = .73) obtained with a sample of college undergraduates. Lief et al. (1990) showed the revised version had temporal stability over a three-week period and internal consistency also with a sample of college undergraduates. They also demonstrated concurrent validity using two other popular sexual attitudes scales. Subsequent confirmatory factor analyses with simple structure using a sample of 516 urban high school students produced six reliable factors including Premarital Sexuality (α = .71), Rape/Coercion (α = .71), Masturbation (α = .78), Abortion (α = .50), Homosexuality (α = .74), and Pornography (α = .54). Two-week test-retest reliability was .88 with the high school sample. Validity coefficients ranged from a low of .18 between intercourse and pornography attitudes to a high of .42 between frequency of sexual experiences (a composite including dating, kissing, petting, and oral sex) and premarital sexual attitudes.

3.2. Instrument composition
The SKAT-A contains a background information section (demographics, family, and personal characteristics), a 41-item knowledge section with True/False/Not Sure response formats (this section is not included in this report), a behavior inventory section with 15 questions regarding sexual activity, condom use, sources of information about sex, age of sexual debut, reasons for not having sex, contraception use, reasons for use/nonuse, 17 additional questions assessing frequency in the past year for dating, kissing, intercourse, masturbation, viewing pornography, discussing contraception, sex with friends, family, and sexual coercion, and an additional set of items assessing female contraceptive use, males getting females pregnant, frequency of sexual intercourse, and STDs. A fourth section includes 40 attitudinal items using a 5-point Likert response

format ("fully disagree" to "fully agree"). The instrument has been administered to thousands of youth in the US and abroad and currently has been translated into Spanish (Peruvian and Mexican), Indian (Kannada), and Malaysian languages.

3.2.1. Translation
We followed standard procedures in the cultural translation of the SKAT-A (Venuti, 1998). A bilingual individual translated from English to Farsi.[2] A second independent bilingual translator then back translated the SKAT-A from Farsi to English without the help of the original version. This English version was then reviewed by one of the authors (LMS) who provided comments on the adequacy of the back translation process. In particular, we took note of lexical differences for words and/or idiomatic expressions between the two cultures. A discussion ensued between the first and second authors regarding the adequacy of certain terms (i.e., face validity), their interpretive meaning in the Farsi language; common vernacular for sexual mores in the Iranian culture, and their comparable use in the English language.

This procedure resulted in some minor item wording differences between the English and Farsi versions of the questionnaire, which were then reconciled. These changes included addition of place of residence and marital status, the latter item used because the Iranian sample included older young adults who may be married. Educational grade delineations were made to comport with Iranian schooling. Changes were also made to questions regarding race and religious/sect background to be consistent with Iranian culture. Three questions in the Behavioral Inventory section were worded differently (e.g., the term "sexual intercourse" was changed to "having a relationship").

3.3. Cognitive pretesting
The SKAT-A (Farsi) was cognitively pretested using a sample of 30 high school and university students (21 university students and 9 high school students). The sample included 17 females and 13 males. The survey was administered to high school students at a public library and administration was conducted by the first author and a graduate student in counseling from the same University. The high school students ranged in age from 17 to 19 and the University students ranged from 21 to 25 years of age. The first author instructed participants that the survey was voluntary, required approximately 30 minutes to complete, and that survey responses were completely anonymous (minimizing social desirability). The first author remained in the vicinity to address any questions regarding the survey. This entailed determining whether participants had any difficulty with the terminology used in the questionnaire (i.e., words like orgasm and STD) and whether they required clarification of any of the items. In keeping with standard cognitive pretesting procedures, students were encouraged to ask questions using think aloud procedures (Forsyth, Lessler, & Hubbard, 1992). Cognitive pretesting took place primarily in the demographically diverse North and East sections of Tehran over a three-week period.

3.4. Sample recruitment
The Iranian investigative team used a messaging service that is very popular and attractive to younger audiences to recruit participants (variety of channels Telegram). The message stated "the link below relates to research in the area of sexuality. In order to participate in this study click on the link, and reply to the questions." This message ran for several days. After clicking on the URL link the participant would see a screen that informed them there was no need to input any personal information. Participants were further informed they could receive information about the study if they provided an email address (without linking names to email). Such information would include aggregate profiles only (e.g., scores for males vs. females, older vs. younger, and so forth). At the end of this introductory paragraph was an email address to communicate with researchers and provide suggestions. The recruitment process lasted six months (May-October, 2016) and the message links with the questionnaire was distributed to 6,637 people from 31 provinces of Iran. A total of 1106 valid questionnaires were submitted online. The University IRB approved the research and the analyses were conducted using de-identified data by the US team.

cogent •• psychology

A Category 4 exemption under 45 CFR 46.101(b) was granted by the US IRB given the use of anonymous data in the analyses.

3.5. Analytic strategy

We analyzed the SKAT-A (Farsi) using exploratory structural equation modeling (ESEM) techniques with the Mplus program (Muthén & Muthén, 2008). Defaults in the ESEM procedure set for maximum likelihood estimation and Geomin rotation. Adequacy of model fit was based on several fit indices including the standardized root mean square residual (SRMR: Jöreksog & Sörbom, 1989), the root mean square error of approximation (RMSEA: Steiger & Lind, 1980), the Comparative Fit Index (CFI: Bentler, 1990), the Tucker Lewis Index (TLI: Tucker & Lewis, 1973), the Bayes Information Critiera (BIC: Schwarz, 1978), and the χ^2/df ratio (Byrne, 2012). With the exception of the information criterion indexes, which are intended to be sample size dependent, the remaining fit indices are independent of sample size, sensitive to model parsimony, and accurately reflect model misspecification (Bentler, 2007).

We also used a Geomin rotation in the models (Epsilon = 0.01).[3] This setting best mimics an oblique rotation, and is considered the optimal rotation for ESEM with four or more factors and when cross-loadings are expected to be small but the factor structure is unknown (Caro, Sandoval-Hernández, & Lüdtke, 2014). To determine an appropriate factor solution, we set the factor loading cut-off at .40 (Tabachnick & Fidell, 2007), used the traditional eigenvalue >1.0, and visually inspected the scree test for evidence of a bend in the plot of eigenvalues against the number of components (Cattell, 1966). We also examined the interpretability of factors, especially if an item had a substantially large cross-loading on more than one factor. Based on Monte Carlo simulation efforts (Muthén & Muthén, 2002) we have sufficient numbers of subjects to achieve precise parameter estimates with adequate power >.80.[4]

4. Results

4.1. Sample description

The sample is 49% female and the mean age is 24 (SD = 6.26). A majority of the sample were single (80%) with 18% reporting they were married, 2% divorced, and <1% widowed. A majority were from Tehran (45%) with smaller amounts from Khorasan Razavi (6%), Esfehan (6%), and Alborz (6%) and even fewer from Fars (4%), Azarbaijan Sharghi (4%), Mazandaran (3.5%), and Gilan (3%), with the remainder <1% in over 23 small villages located on the outskirts of Tehran. The sample contained 19% high school students, 55.5% enrolled in the University, and 25% in a graduate program. Among the high school participants, the largest proportion was registered in a diploma program (6%), followed in decreasing grade order by 12th grade (5%), 11th grade (3.4%), 10th grade (2.5%), and 9th grade (2%). Among the University participants, a majority were enrolled in a bachelor degree program (59%) followed by Master's degree (11%), Associate degree (6.5%), Ph.D. (4%) and the rest were enrolled in some other educational program.

When asked about their race/ethnic backgrounds, a majority reported they were Fars (63%) with the next largest group Tork (19%), Kord (6%), LOR (4%) and Gilac (3.5%). Smaller numbers reported they were Arab (1.4%), Mongrel (1.5%), Torkaman or Balooch (<1%). Religious affiliation was reported as 96% Islam-Sheih, 3.4% as Islam-Sunni, and very small numbers for Jewish, Zoroastrian or Christian faiths (<1%). Employment status was fairly evenly distributed with 32% stating they were students, 24.5% employed, 24% self-employed, 16% unemployed and 3.7% stated they were a housewife. Participants were asked how often they attended a religious ceremony and 38% indicated "never" while 44% said "less than once a month," 8.4% said "once a month," 5.7% said "several times/ month," 2% said "one a week," and 2.2% said "several times/week."

4.2. Results of ESEM analyses

We began the factor analysis procedure with the full set of 40 attitudinal items. Eight of these items assessing sexual education (e.g., "sex education should be required in the schools" and "sex

education should be restricted to anatomy") did not exceed the minimum threshold for a loading (>.40). Based on a careful review of the item loadings and understanding the cultural sensitivities inherent in the sample regarding sex education, we decided to eliminate these items and rerun the factor analysis with the remaining 32 items.

Table 1 shows the results of the ESEM model testing sequence from a 1 to 8-factor model solution. As expected, model fit improved with increasing extraction of factors. With the progressive addition of factors, the CFI improves, the RMSEA and SMSR decrease below the acceptable benchmarks (<.05) as does the BIC, with lower values indicating better fit. There is a noticeable change in fit statistics at the 7-factor model, marked by a slowing down of the decrement in the BIC. However, upon closer inspection of the item-to-factor loadings the 6-factor model not only favored parsimony it also made sense from a substantive point of view. The six factors (and their average rotated factor loading) included a 5-item factor assessing *premarital sexuality* (e.g., "sex relations before marriage is not morally acceptable": avg. λ = .636), a 5-item factor assessing *masturbation* (e.g., "those who have healthy sexual activities don't masturbate": avg. λ = .672), a 4-item factor assessing *homosexuality* (e. g., "homosexuals should be allowed to marry each other": avg. λ = .71), a 5-item factor assessing *pornography* (e.g., 'only individuals that have perversion watch porn movies': avg. λ = .50), a 4-item factor assessing *abortion* (e.g., "abortion permit shall be issued to a pregnant female": avg. λ = .58), and a 6-item factor assessing *sexual coercion* (e.g., 'women should obey men's sexual requests': avg. λ = .46). As further indication of the rotational efficiency, the largest off-factor loading was .29 and the average of these loadings was .06 for *premarital sexuality*, .08 for *masturbation*, .04 for *homosexuality*, .08 for *pornography*, .05 for *abortion*, and .05 for *sexual coercion*.[5]

Two masturbation ("boys who have group masturbation will become homosexuals in the future," and "female young adults who masturbate are weird") and one pregnancy item ("a pregnant young adult should decide about abortion rather than their parents or boyfriend") failed to load on any factor. These items presented respondents with difficult grammatical constructions (containing a compound sentence structure), used unfamiliar vernacular (i.e., "weird"), or contained multiple options (e.g., offering two choices with respect to abortion decisions), all of which may have contributed to interpretational confusion.

Table 2 contains the factor intercorrelations for the 6-factor solution. The associations ranged from a low of r = .08 between pornography and sexual coercion to a high of r = .56 between masturbation and pornography. The average magnitude of association across the 15 correlated pairs was r = .35. Sexual coercion had the smallest magnitude of association with the remaining factors (avg. r = .19) while premarital sexuality had the largest magnitude of association with the remaining factors (avg. r = .40).[6]

4.3. Tests of invariance

We tested measurement invariance in a progression moving from a basic configural model (the same number of factors exists in each group), to test metric (equivalence of factor loadings), scalar (equivalence of item intercepts), equivalence of variance/covariances (structural relations) and factor means. Table 3 shows the results of the invariance tests for gender (540 female vs. 566 male), age (738 ≤ 25 years vs. 366 > 26), and religious commitment (418 never vs. 688 at least once). For the most part, there was little evidence for substantive parameter differences in the models across subgroups. Any differences were quite trivial by nature, and given it sensitivity the large-sample chi-square test would be significant in most cases. In all cases, the configural model fit well establishing the 6-factor model was equivalent across groups (first line). The imposition of various model constraints did not lead to substantial degradation of model fit. The change at each step in the model testing sequence observed in all of the inferential fit indices (e.g., CFI, the RMSEA, and SRMR) are quite small, indicating the different model constraints are tenable.

Table 4 shows means scores for the six attitude factor composites by age, gender, and religious commitment level. Although there was no consistent pattern observed for these comparisons,

cogent · psychology

Table 1. Model fit indices for ESEM factor analysis of SKAT-A Farsi

Model	χ^2 (df)	CFI	TLI	RMSEA	90%CI lower	90%CI upper	SRMR	AIC	BIC	$\Delta \chi^2$ (df)
Factor 1	4683.8 (464)	0.645	0.621	0.091	0.088	0.093	0.075	100319.4	100800.2	
Factor 2	3382.5 (433)	0.752	0.716	0.078	0.076	0.081	0.060	99080.1	99716.2	1301.3 (31)
Factor 3	2525.7 (403)	0.822	0.781	0.069	0.066	0.072	0.048	98283.3	99069.6	856.8 (30)
Factor 4	1667.7 (374)	0.891	0.856	0.056	0.053	0.059	0.037	97483.3	98414.9	858 (29)
Factor 5	1203.3 (346)	0.928	0.897	0.047	0.044	0.050	0.030	97075.0	98146.8	464.3 (28)
Factor 6	784.9 (319)	0.961	0.939	0.036	0.033	0.040	0.022	96710.6	97917.6	418.4 (27)
Factor 7	583.7 (293)	0.976	0.959	0.030	0.026	0.033	0.018	96561.3	97898.6	201.2 (26)
Factor 8	492.2 (268)	0.981	0.965	0.028	0.024	0.031	0.016	96519.9	97982.3	91.5 (25)

CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval;
SRMR = Square Root Mean Residual; TLI = Tucker Lewis Index; Δ = change value.

Table 2. Correlations from 6-factor model						
	1	**2**	**3**	**4**	**5**	**6**
1 Premarital Sexuality	0.846					
2 Masturbation	0.488	0.845				
3 Homosexuality	0.507	0.460	0.835			
4 Pornography	0.361	0.563	0.308	0.733		
5 Abortion	0.483	0.402	0.440	0.334	0.702	
6 Sexual Coercion	0.167	0.132	0.249	0.080	0.331	0.660

All p's < .05. Geomin rotation. Omega reliability estimate on the diagonal.
Calculated using parameter estimates obtained from a CFA model (McDonald, 1999).

several interesting findings should be noted. First, older participants had higher (more conservative) premarital sexual attitude, abortion, and sexual coercion scores. For gender, females reported more conservative masturbation and pornography attitudes and less conservative (less approving) sexual coercion scores. All six attitude factor scores differed significantly based on level of religious commitment. In all six cases, participants who never attended religious events reported less conservative sexual attitudes.

4.4. Sexual behavior items

There were 11 sexual behavior items in the SKAT-A that were suitable for the Iranian culture. We contrasted responses on these items by the three demographic grouping measures (age, gender, and religious commitment level) using proportional tests of independence (Table 5). For age (up to 25 vs. 26 and older), younger participants were more likely to report having less sexual experience compared to friends, $\chi^2(2) = 9.17$, $p < .05$, to have a much earlier sexual debut, $\chi^2(3) = 77.86$, $p < .001$, to be younger on their first date, $\chi^2(3) = 101.16$, $p < .001$, and more likely to report they talked with friends about sex more frequently (once a day) than older participants, $\chi^2(4) = 15.64$, $p < .01$. Older participants, on the other hand, were more likely to report they forced their sexual partner to have sex, $\chi^2(1) = 4.24$, $p < .05$, more likely to be forced to have sex, $\chi^2(1) = 10.84$, $p < .001$, and more likely to have an STD infection, $\chi^2(1) = 31.62$, $p < .001$, than younger participants.

A total of six of the 11 gender comparisons were significant. Male participants were more likely to report they had greater sexual knowledge compared to their friends, $\chi^2(2) = 22.36$, $p < .001$, be younger at their sexual debut, $\chi^2(3) = 12.06$, $p < .01$, talk more frequently about sex with their friends, $\chi^2(4) = 64.01$, $p < .001$, report having more sexual partners, $\chi^2(2) = 28.53$, $p < .001$, more likely to force their partner to have sex, $\chi^2(1) = 6.20$, $p < .05$, and less likely to report they were forced to have sex, $\chi^2(1) = 6.84$, $p < .01$ or discuss sex with their parents, $\chi^2(1) = 24.00$, $p < .001$.

Level of religious commitment also significantly differed with those reporting less religious commitment (never attending events) were more likely to report greater sexual experience compared to their friends, $\chi^2(2) = 14.01$, $p < .001$, more sexual knowledge than their friends, $\chi^2(2) = 20.39$, $p < .001$, and were more frequently discuss sex with their friends, $\chi^2(4) = 11.26$, $p < .05$.

Table 6 contains the correlations between the 11 sexual behavior items and the 6 factor (weighted) composite scores. Interestingly, these associations were relatively small in magnitude. The average association across all 66 correlations was $r = .086$, indicating less than 1% common variance. The largest average correlation within each attitudinal composite across the 11 sexual behaviors was for premarital sex, $r = .105$, and the largest correlation within the sexual behavior items across the 6 attitudinal composites was for sexual knowledge compared to friends, $r = .18$.

cogent ••psychology

Table 3. Fit indices for measurement invariance tests

		χ² (df)	CFI	TLI	RMSEA	90%CI lower	90%CI upper	SRMR	Δ χ² (df)
Age	Configural invariance	1140.1 (638)	0.958	0.935	0.038	0.034	0.041	0.026	
(< 26 years, ≥ 26 years)	FL invariance	1364.0 (794)	0.953	0.941	0.036	0.033	0.039	0.035	223.8 (156)
	Intercepts invariance	1480.8 (820)	0.945	0.933	0.038	0.035	0.041	0.038	116.9 (26)
	Factor Var/Cov invariant	1520.1 (841)	0.943	0.933	0.038	0.035	0.041	0.043	39.3 (21)
	Factor means invariant	1556.1 (847)	0.941	0.931	0.039	0.036	0.042	0.044	35.9 (6)
Gender	Configural invariance	1147.0 (638)	0.957	0.933	0.038	0.034	0.042	0.027	
(female, male)	FL invariance	1365.9 (794)	0.952	0.94	0.036	0.033	0.039	0.035	218.9 (156)
	Intercepts invariance	1514.1 (820)	0.942	0.929	0.039	0.036	0.042	0.038	148.2 (26)
	Factor Var/Cov invariant	1565.6 (841)	0.939	0.928	0.039	0.036	0.042	0.045	51.5 (21)
	Factor means invariant	1810.4 (847)	0.919	0.905	0.045	0.042	0.048	0.057	244.8 (6)
Religious Commitment	Configural invariance	1199.8 (638)	0.946	0.916	0.040	0.036	0.043	0.028	
(never, at least once)	FL invariance	1421.9 (794)	0.940	0.925	0.038	0.035	0.041	0.037	222.0 (156)
	Intercepts invariance	1468.8 (820)	0.938	0.925	0.038	0.035	0.041	0.039	47.0 (26)
	Factor Var/Cov invariant	1501.8 (841)	0.937	0.925	0.038	0.035	0.041	0.043	33.0 (21)
	Factor means invariant	1753.5 (847)	0.913	0.898	0.044	0.041	0.047	0.088	251.7 (6)

CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval;
SRMR = Square Root Mean Residual; TLI = Tucker Lewis Index; Δ = change value; FL = Factor Loading; Var/Cov = Variance/Covariance matrix.

Table 4. Attitude factor composites by age, gender and religious ceremony

	Age			Gender			Religious ceremony		
	Up to 25	26 and more	p	Female	Male	p	Never	At least once	p
Premarital Sexuality	15.89 (4.72)	16.85 (4.95)	0.002	16.74 (5.05)	16.35 (4.73)	0.186	14.22 (4.61)	17.94 (4.51)	0.000
Masturbation	21.82 (5.51)	22.01 (5.52)	0.585	22.98 (5.15)	20.97 (5.68)	0.000	19.68 (5.48)	23.33 (5.07)	0.000
Homosexuality	12.91 (3.96)	13.35 (3.99)	0.085	13.01 (3.90)	13.40 (4.07)	0.104	11.32 (3.92)	14.36 (3.58)	0.000
Pornography	13.63 (3.73)	13.56 (3.91)	0.776	14.47 (3.73)	12.76 (3.79)	0.000	12.09 (3.55)	14.51 (3.74)	0.000
Abortion	12.94 (3.93)	13.89 (4.02)	0.000	13.36 (4.00)	13.79 (4.02)	0.072	12.04 (3.79)	14.51 (3.86)	0.000
Sexual Coercion	10.81 (3.35)	11.31 (3.26)	0.017	10.36 (3.00)	11.91 (3.40)	0.000	10.28 (3.03)	11.68 (3.34)	0.000

Tabled values are means (SD). Statistical comparisons conducted using independent Student's t-tests.
Non-parametric Mann–Whitney tests did not produce substantial test statistic or parameter estimate deviations.

cogent •• psychology

Table 5. Sexual behavior comparisons by age, gender, and religious ceremony

	Age			Gender			Religious Commitment		
	Up to 25	26 and more	p	Female	Male	p	Never	At least once	p
Sexual experience compared to friends			0.010			0.053			0.001
Less experience	47.15%	37.70%		46.85%	41.34%		40.19%	46.37%	
Same experience	31.30%	35.52%		32.78%	32.51%		30.38%	34.01%	
More experience	21.54%	26.78%		20.37%	26.15%		29.43%	19.62%	
Sexual knowledge compared to friends			0.300			0.000			0.000
Less knowledge	18.02%	19.13%		21.67%	15.19%		14.59%	20.64%	
Same knowledge	42.28%	37.43%		44.44%	37.28%		36.12%	43.60%	
More knowledge	39.70%	43.44%		33.89%	47.53%		49.28%	35.76%	
Age of first sexual relationship			0.000			0.007			0.134
Up to 15	10.29%	6.35%		4.61%	12.01%		11.16%	6.88%	
16 to 20	69.77%	44.44%		58.99%	61.13%		54.91%	64.49%	
21 to 25	19.94%	30.69%		27.19%	21.55%		26.34%	22.10%	
26 and more	0.00%	18.52%		9.22%	5.30%		7.59%	6.52%	
Age on first date			0.000			0.214			0.679
Up to 13	6.26%	2.60%		6.00%	3.92%		4.61%	5.19%	
13 to 17	52.24%	28.90%		43.65%	44.24%		41.79%	45.38%	
18 to 22	39.18%	49.68%		40.88%	44.93%		45.24%	41.35%	
23 and more	2.33%	18.83%		9.47%	6.91%		8.36%	8.08%	
Sexual intercourse person of opposite sex			0.415			0.405			0.618
Never	19.40%	12.73%		16.00%	18.80%		17.55%	17.65%	
Less than once a month	39.13%	41.82%		38.29%	41.03%		38.30%	41.18%	
Once a month	21.74%	20.00%		20.00%	22.22%		19.68%	22.62%	
Once a week	18.39%	24.55%		24.57%	16.67%		23.40%	17.19%	
Talking with friends about sex			0.004			0.000			0.024

(Continued)

cogent · psychology

Table 5. (Continued)

	Age			Gender			Religious Commitment		
	Up to 25	26 and more	p	Female	Male	p	Never	At least once	p
Never	13.99%	17.01%		19.22%	10.64%		15.50%	14.10%	
Less than once a month	24.05%	32.99%		33.58%	19.36%		22.22%	28.39%	
Once a month	19.39%	14.95%		19.46%	17.45%		16.37%	19.67%	
Once a week	26.53%	27.84%		19.95%	32.98%		27.78%	26.35%	
Once a day	16.03%	7.22%		7.79%	19.57%		18.13%	11.50%	
Number of sexual partners			0.448			0.000			0.217
1	56.09%	52.17%		71.33%	41.90%		50.70%	58.33%	
2–3	39.57%	45.65%		27.27%	52.51%		46.48%	37.22%	
4 and more	4.35%	2.17%		1.40%	5.59%		2.82%	4.44%	
Talk with parents about sex			0.632			0.000			0.277
No	84.69%	86.08%		78.59%	90.43%		86.55%	83.86%	
Yes	15.31%	13.92%		21.41%	9.57%		13.45%	16.14%	
Forcing sexual partner to have sex			0.039			0.013			0.376
No	91.11%	86.08%		92.70%	87.66%		88.89%	90.72%	
Yes	8.89%	13.92%		7.30%	12.34%		11.11%	9.28%	
Being forced to have sex			0.001			0.009			0.699
No	90.52%	82.05%		85.68%	91.28%		89.18%	88.33%	
Yes	9.48%	17.95%		14.32%	8.72%		10.82%	11.67%	
Having an STD infection			0.000			0.499			0.170
No	98.83%	91.24%		97.57%	96.81%		96.20%	97.77%	
Yes	1.17%	8.76%		2.43%	3.19%		3.80%	2.23%	

cogent ·· psychology

Table 6. Correlations between factor composite scores and sexual behavioral items

	Premarital Sexuality	Masturbation	Homosexuality	Pornography	Abortion	Sexual Coercion
Sexual experience compared to friends (N = 1106)[ε]	−.176**	−.131**	−.091**	−.163**	−.191**	−.063*
Sexual knowledge compared to friends (N = 1106)[ε]	−.161**	−.234**	−.125**	−.209**	−.229**	−.102**
Age of first sexual relationship (N = 500)[ε]	−.055	.056	.050	.118**	.031	−.085
Age on first date (N = 867)[ε]	.065	.045	.087*	.099**	.014	.019
Sexual intercourse—person of opposite sex (N = 409)[ε]	−.176**	−.145**	−.059	−.063	−.181**	−.047
Talking with friends about sex (N = 881)[ε]	−.133**	−.156**	−.089**	−.193**	−.109**	.007
Number of sexual partners (N = 322)[ε]	−.047	−.057	.051	−.126*	−.064	.089
Talking with parents about sex (N = 881)[β]	−.052	.016	−.056	−.009	−.025	−.111**
Forcing sexual partner to have sex (N = 881)[β]	−.125**	−.118**	−.041	−.087*	−.055	.058
Being forced to have sex (N = 882)[β]	−.091**	−.048	−.054	−.014	−.042	.034
Having an STD infection (N = 881)[β]	.071*	.038	.057	.026	.072*	.002

[ε]Spearman correlation coefficient; [β]Point bi-serial correlation coefficient; * = p < 0.05; ** = p < 0.01

5. Discussion

This article used ESEM to explore the psychometric properties of a Farsi translated instrument assessing sexual attitudes and behavior (SKAT-A). The sample of predominantly Muslim Iranians consisted of high school youth and college-age young adults that responded to a messaging service with a hyperlink to the survey platform. The majority of the sample was from Tehran, a major metropolis with one-fifth of the nation's population, and was ethnically and demographically diverse. The translation procedure produced some minor changes to item wording, necessitated by the cultural differences between westernized and the more secular Iranian society. This is not atypical and has been observed to occur in other studies assessing sexual behavior where cultural sensitivities matter (e.g., Mohammad et al., 2007). Outside of these few changes in vernacular (primarily with behavioral items) the core portions of the instrument remained intact and cognitive testing indicated the instrument has face validity.

The ESEM factor analyses produced an adequate 6-factor solution meeting the criteria of both parsimony and a clear substantive interpretation of the factors. The benchmark for factor loadings was somewhat strict (>.40) but produced a meaningful solution with very few sizable cross-loadings. The lack of substantial cross-loadings suggests that the obtained factors represent distinct clusters clearly operationalized by their respective items. As expected, the ESEM produced a better fit compared to a CFA, the latter which requires simple structure (Morin & Maïano, 2011). Importantly, the 6-factor dimensional structure was consistent with the English version (Fullard & Scheier, 2010), with the exception that we did not obtain a clear-cut factor assessing sexual education. Even given that the SKAT-A was initially developed with English speaking youth, it would appear there is a common ground with regard to assessing sexual attitudes in both Muslim religious communities and more westernized industrial countries.

With only one exception, scale reliabilities exceeded the traditional benchmark of .70, the exception was the 4-item scale assessing abortion. The four abortion items include providing a permit for abortion to females, equating abortion with homicide, allowing abortion only in cases of rape or incest, and abortion perceived as more sinful than an unwanted child. There was one additional abortion item asking who should decide about abortion, however, this item did not load appreciably on this or any other factor. A careful inspection of the pattern of factor inter-correlations shows that we achieved good discriminant validity with the largest association only accounting for 32% of shared variance (pornography and masturbation). The weakest set of relations was observed between sexual coercion and all of the remaining attitudinal factors, perhaps indicating that being forced into sexual relations is not a large part of Iranian sexual experiences and unrelated to their conservative attitudes.

One of the goals of this study involved empirically examining the relations between attitudes and behavior. The focus on attitudes dovetails nicely with a reasoned action approach (Ajzen & Fishbein, 1977), which posits attitudes as one of several precursors to behavioral action.[7] Cast in a health setting, application of a reasoned action approach would suggest that modification of attitudes through psycho-educational interventions will produce behavior change (Ajzen, Albarracín, & Hornik, 2007). In light of the utility of this overarching theoretical framework, one interesting finding was that the associations between sexual attitudes and behavior were at best modest in size. Even given the low magnitude of association, the pattern of relations did reveal that less sexual experience and less sexual knowledge (compared to friends) is associated with more conservative views toward sex, and likewise, later sexual debut was also related to more conservative attitudes. This bodes well for designing theory-based psychological interventions that utilize persuasive communication strategies to target attitudinal change. Moreover, efforts like this remain consistent with Islamic teaching, reinforcing decency, modesty and the need for abstinence until marriage. One other notable finding was the relation between having an STD (2.3% said "yes") and sexual attitudes, which were all positive, indicating these individuals had more conservative values. It is possible that contracting a STD caused reactive dissonance pushing these individuals in the direction of more conservative beliefs.

cogent •• psychology

The multiple group comparisons, which adhered to conventions for testing weak, strong, and strict invariance, indicated that the obtained 6-factor structure fit well for all three subgroup comparisons. This suggests that the SKAT-A Farsi efficiently assesses sexual attitudes in Iranians with no discrepancy in the meaning of the attitudinal items or the underlying dimensional structure between subgroups.

As expected, age factored into sexual experience with older participants reporting more sexual knowledge and experience. Care must be taken when interpreting these findings as there may also be an age cohort effect. For instance, older participants also reported their sexual debut occurring at an older age (>21) and also dating for the first time when they were older (>18). In conjunction with this finding, older participants also held more conservative values toward premarital sexuality, abortion, and sexual coercion. The latter finding may reflect confounding given that older participants had more sexual experiences yielding more opportunities for sexual coercion, and not reflect the effect of age alone.

Also consistent with other studies of Muslim cultures females reported less knowledge about sex (compared to their friends), they were less likely to talk frequently about sex with their friends (once a week or once a day) and they had more conservative attitudes toward sex. Females also reported being older at their sexual debut and were more likely to have fewer sex partners compared to males. Despite evidence showing that the primary source of information about sex is from peers among Iranian youth (Malek et al., 2010), females in the current study were more likely to talk with their parents about sex. This opens the door for involving parents in their child's sexual upbringing, particularly if they converse about sexuality in a supportive manner. This approach is consistent with Islamic teaching reinforcing the important role parents have to shepherd their child's growth and guide their behavior (Faghihi et al., 2008). Considerable evidence from studies of western youth show that parental communication is protective (e.g., Giles & Scheier, 2014). This is bolstered by a study showing that Iranian female college students having premarital sex also reported less mother-daughter communication on sensitive issues (Khalaj et al., 2011). A review of studies conducted in Africa also reinforce the importance of parent-child communication in stimulating protective behaviors (e.g., Bastien, Kajula, & Muhwezi, 2011). Likewise, interventions framed by communication theories have successfully targeted sex-related risk taking in youth (e.g., O'Donnell, Myint-U, Duran, & Stueve, 2010) making it conceivable to adopt these approaches in Iran. Along these lines, Shirpak, Ardebili, Shirpak et al. (2007) demonstrated significant effects on sexual knowledge and attitudes from a brief didactic sex education course administered to married females attending urban health centers in Iran.

As expected, religious commitment was protective, with more involvement in religious ceremonies associated with more conservative sexual attitudes. The same was largely true of behavior, with individuals reporting greater religious commitment also reporting less sexual experience and less sexual knowledge compared to their friends, and they were also less likely to discuss sex with their friends on a frequent basis. This finding is in keeping with other Iranian studies that have reported a protective effect for religious beliefs and participation (Honarvar et al., 2016; Mohammadi et al., 2006). Future research may want to expand on this theme and confirm what particular aspects of religious commitment is protective, given there are differences between participation in religious traditions and believing in the faith's core principles. Learning more about these differences could be useful if the nation's religious leaders wish to incorporate sex education into their moral foundation.

5.1. Implications

The Iranian government is now more than ever aware of the need for sexual education to remediate the rising specter of sexually transmitted disease, including HIV/AIDs, and unwanted pregnancy. There is even a nationwide push to develop effective health promotion programs that can offset the poor understanding of sexual reproductive health by youth (Ghorbani, Zamani-Alavijeh, Shahry, Zare, & Marashi, 2015). Toward this goal, the Farsi version of the SKAT-A provides a psychometrically reliable instrument that can be used to monitor the sexual attitudes and behavior of young Iranians. Equally compelling, the instrument can gauge the success of sexual education as it takes

cogent •• psychology

hold in Iran (Tabatabaie, 2015). The observation of gender differences in sexual attitudes suggests that programs may want to address familial socialization through gender sensitive interventions (e.g., Farahani, Shah, Cleland, & Mohammadi, 2012). This strategy has been successfully applied in the US as a mother-daughter intervention to reduce substance use (Schinke, Fang, & Cole, 2009) and also HIV risk (Di Noia, Schinke, Pena, & Schwinn, 2004). Programs of this nature can be adapted to fit Muslim value structures and capitalize on traditional methods of delivery (i.e., reproductive health clinics) or use computer-mediated platforms to expand their reach.

Second, the current study also provides much need information to formulate government health policy and design programs targeting a more informed society with greater awareness of sexual reproductive health and protections against STDs. As Halstsead (1997) pointed out two decades ago Muslim communities such as the Iranian Republic are not against sexual education as long as it is not in conflict with the fundamental principles inherent in Islamic teaching. This underscores the important protective effect of religious commitment, which is consistent with Islamic teachings. Finding ways to combine this knowledge with the importance of family guidance in teaching children about human sexuality would be an important next step.

Several cautions should be noted. The cross-sectional nature of the survey prohibits making causal assertions. Longitudinal studies are required that track the evolution of sexual attitudes and behavior. This will enable the identification of critical age periods for intervention and finding when attitudes are most malleable. In addition, the current psychometric work represents only the beginning of scale construction as further refinement and validation of the SKAT-A Farsi must ensue to rigorously test the instrument in different settings and under different administration conditions.

Author details
Mahsa Motedayen[1]
E-mail: mahsamtyn@gmail.com
ORCID ID: http://orcid.org/0000-0002-0081-9214
Seyed Mohammad Kalantarkousheh[2]
E-mail: kalantar.counseling@gmail.com
ORCID ID: http://orcid.org/0000-0002-3269-1489
Lawrence M. Scheier[3]
E-mail: scheier@larsri.org
ORCID ID: http://orcid.org/0000-0003-2254-0123
Martin Komarc[4]
E-mail: komarc@volny.cz
[1] Department of Psychology and Education Science, University of Tehran, Tehran, Iran.
[2] Department of Counseling, Faculty of Psychology and Education Sciences, Allameh Tabataba'i University, Tehran, Iran.
[3] LARS Research Institute, Visiting Scholar, UNC Greensboro, Department of Public Health Education, Senior Research Scientist, Prevention Strategies, LLC, Scottsdale, AZ, USA.
[4] Faculty of Physical Education and Sport, Department of Kinanthropology and Humanities, Charles University in Prague, Prague, Czech Republic.

Cover image
Source: Author.

Notes
1. Technical considerations for how these parameter constraints are handled with both unrotated and rotated solutions is explained in both Marsh et al. (2009) and also in Asparouhov and Muthén (2009).
2. The English and Farsi version of the SKAT-A may be purchased from LARS Research Institute, USA (www.larsri.org).
3. We also compared this setting to .05, .03, .1 and .5 as a crude sensitivity analysis, suggested by one of the reviewers. The deviations in factor loadings were quite trivial (range .01 to .04) across the four Epsilon comparisons to .01 and averaged for all six factors.
4. This determination was based on using 10,000 replications with ML estimation and using the criteria of adequate coverage (the 95% Confidence Interval contains the parameter), low standard error bias, and a high proportion of replications where we can reject the null specifying the parameter is zero at the .05 level, in essence, the power of the study to reject the null when it is false.
5. Communalities (h^2) and rotated factor pattern loadings are available from the third author.
6. At the suggestion of one reviewer, we also compared the fit of a CFA model positing simple structure against the 6-factor ESEM. Although purely descriptive, the fit of the ESEM was superior, $\chi^2 = 784.92(319)$, CFI = .961, TLI = .939, RMSEA = .036, SRMR = .022, AIC = 96,710, BIC = 97,917 compared to the CFA, $\chi^2 = 1705.17(449)$, CFI = .894, TLI = .883, RMSEA = .05, SRMR = .051, AIC = 97,370, BIC = 97,926. Clearly, the restrictions on factor loadings in the CFA model (nontarget loadings are constrained to be zero) leads to a poorer fit. In addition, the average factor correlation in the CFA is quite high ($r_{avg.}$ = .49), compared to the ESEM ($r_{avg.}$ = .35) resulting in less optimal discriminant validity in the CFA model.

7. This is a simplification of the theory of reasoned action, which requires inclusion of beliefs (subjective norms and social acceptability), and intentions, the latter posited to be more proximal instigators of behavior change. However, attitudes are an essential component of the theory and can be the focus of persuasive change.

References

Ajzen, I., Albarracín, D., & Hornik, R. (Eds.). (2007). *Prediction and change of health behavior: Applying the reasoned action approach*. Mahwah, NJ: Lawrence Erlbaum Publishers.

Al Johar, D. (2005). Muslim marriages in America: Reflecting new identities. *The Muslim World*, *95*(4), 557–574. doi:10.1111/muwo.2005.95.issue-4

Asparouhov, T., & Muthén, B. O. (2009). Exploratory structural equation modeling. *Structural Equation Modeling*, *16*, 397–438. doi:10.1080/10705510903008204

Bastien, S., Kajula, L. J., & Muhwezi, W. W. (2011). A review of studies of parent-child communication about sexuality and HIV/AIDS in sub-Saharan Africa. *Reproductive Health*, *8*, 25. doi:10.1186/1742-4755-8-25

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*(2), 238–246.

Bentler, P. M. (2007). On tests and indices for evaluating structural models. *Personality and Individual Differences*, *42*(5), 825–829. doi:10.1016/j.paid.2006.09.024

Byrne, B. M. (2012). *Structural equation modeling with Mplus: Basic concepts, application, and programming*. New York, NY: Taylor & Francis Group.

Caro, D. H., Sandoval-Hernández, A., & Lüdtke, O. (2014). Cultural, social and economic capital constructs in international assessments: An evaluation using exploratory structural equation modeling. *School Effectiveness and School Improvement*, *25*(3), 433–450. doi:10.1080/09243453.2013.812568

Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*, *1*(2), 245–276. doi:10.1207/s15327906mbr0102_10

Di Noia, J., Schinke, S. P., Pena, J. B., & Schwinn, T. M. (2004). Evaluation of a brief computer-mediated intervention to reduce HIV risk among early adolescent females. *Journal of Adolescent Health*, *35*(1), 62–64. doi:10.1016/j.jadohealth.2003.09.006

Dimitrov, D. M. (2010). Testing for factorial invariance in the context of construct validation. *Measurement and Evaluation in Counseling and Development*, *43*(2), 121–149. doi:10.1177/0748175610373459

Doi, A. R. I. (1984/1404). *Shari'ah: The Islamic law*. London, UK: Ta Ha.

Faghihi, A. N., Shokouhi Yekta, M., & Parand, A. (2008). Sexual education of children and adolescents based on Islamic view and psychological studies. *Biquarterly Journal of Islamic Education*, *3*(7), 51–80.

Farahani, F. K., Shah, I., Cleland, J., & Mohammadi, M. R. (2012). Adolescent males and young females in Tehran: Differing perspectives, behaviors and needs for reproductive health and implications for gender sensitive interventions. *Journal of Reproduction & Infertility*, *13*(2), 101–110.

Forsyth, B. H., Lessler, J. T., & Hubbard, M. L. (1992). Cognitive evaluation of the questionnaire. In C. F. Turner, J. T. Lessler, & J. C. Gfroerer Eds., *Survey measurement of drug use: Methodological studies* DHHS Publication No. ADM 92-1929 (pp. 13–52). Rockville, MD: National Institute on Drug Abuse.

Fullard, W., Johnston, D. A., & Lief, H. I. (1998). The Sexual knowledge and attitude test for adolescents. In C. M. Davis, W. L. Yarber, R. Bauseman, G. Schreer, & S. L. Davis (Eds.), *Handbook of sexuality-related measures* (pp. 30–35). Thousand Oaks, CA: Sage Publications.

Fullard, W., & Scheier, L. M. (2010). The sexual knowledge and attitude test – adolescents: Psychometric properties using confirmatory factor analysis methods. In T. D. Fisher, C. M. Davis, W. L. Yarber, & S. L. Davis (Eds.), *Handbook of sexuality-related measures* (3rd ed., pp. 16–18). New York, NY: Taylor and Francis.

Ghorbani, M., Zamani-Alavijeh, F., Shahry, P., Zare, K., & Marashi, T. (2015). Understanding childhood's sexual curiosity: An introduction to sexual health education and health promotion. *Iranian Journal of Health Education & Promotion*, *3*(2), 198–210.

Giles, S. M., & Scheier, L. M. (2014). A primer on parent-child communication: Why conversations matter. In L. M. Scheier & W. B. Hansen (Eds.), *Parenting and teen drug use: The most recent findings from research, prevention, and treatment* (pp. 127–147). New York, NY: Oxford University Press.

Halstsead, J. M. (1997). Muslims and sex education. *Journal of Moral Education*, *26*(3), 317–330. doi:10.1080/0305724970260306

Harkness, J. A., Van De Vijver, F. J. R., & Mohler, P. P. H. (2003). *Cross cultural survey methods*. Hoboken, NJ: John Wiley & Sons.

Honarvar, B., Salehi, F., Barfi, R., Asadi, Z., Honarvar, H., Odoomi, N., … Lankarani, K. B. (2016). Attitudes toward and experience of singles with premarital sex: A population-based study in Shiraz, Southern Iran. *Archives of Sexual Behavior*, *45*(2), 395–402. doi:10.1007/s10508-015-0577-2

Jöreksog, K. G., & Sörbom, D. (1989). *LISREL 7: A guide to the program and applications*. Chicago, IL: SPSS, Inc.

Khalaj, F., Farahani, A., Cleland, J., & Mehryar, A. H. (2011). Associations between family factors and premarital heterosexual relationships among female college students in Tehran. *International Perspectives on Sexual and Reproductive Health*, *37*(1), 30–39. doi:10.1363/3703011

Kline, P. (1994). *An easy guide to factor analysis*. New York, NY: Routledge.

Lief, H. I., Fullard, W., & Devlin, S. J. (1990). A new measure of adolescent sexuality: SKAT-A. *Journal of Sex Education & Therapy*, *16*(2), 79–91. doi:10.1080/01614576.1990.11074980

Malek, A., Shokoohi, H. A., Faghihi, A. N., Bina, M., & Shafiee-Kandjani, A. R. (2010). A study on the sources of sexual knowledge acquisition among high school students in Northwest Iran. *Archives of Iranian Medicine*, *13*(6), 537–542.

Marsh, H. W., Liem, G. A. D., Martin, A. J., Morin, A. J. S., & Nagengast, B. (2011). Methodological-measurement fruitfulness of exploratory structural equation modeling (ESEM): New approaches to key substantive issues in motivation and engagement. *Journal of Psychoeducational Assessment*, *29*, 322–346. doi:10.1177/0734282911406657

Marsh, H. W., Lüdtke, O., Muthén, B., Asparouhov, T., Morin, A. J. S., Trautwein, U., et al. (2010). A new look at the big five factor structure through exploratory structural equation modeling. *Psychological Assessment*, *22*(3), 471–491. doi:10.1037/a0019227

Marsh, H. W., Muthén, B., Aparouhov, T., Lüdtke, O., Robitzsch, A., Morin, J. S., et al. (2009). Exploratory structural equation modeling, integrating CFA and EFA: Application to students' evaluations of university teaching. *Structural Equation Modeling*, *16*, 439–476. doi:10.1080/10705510903008220

McDonald, P. R. (1999). *Test theory: A unified treatment*. Mahwah, NJ: Lawrence Erlbaum Associates.

Miller, W. R., & Lief, H. I. (1976). Masturbatory attitudes, knowledge, and experience: Data from the Sex Knowledge and Attitudes Test (SKAT). *Archives of Sexual Behavior, 5*(5), 447–467.

Miller, W. R., & Lief, H. I. (1979). The sex knowledge and attitudes test (SKAT). *Archives of Sexual Behavior, 5*(3), 282–287.

Mohammad, K., Farahani, F. K. A., Mohammadi, M. R., Alikhani, S., Zare, M., Tehrani, F. R., … Ghanbari, H. (2007). Sexual risk-taking behaviors among boys aged 15-18 years in Tehran. *Journal of Adolescent Health, 41*, 407–414. doi:10.1016/j.jadohealth.2007.05.003

Mohammadi, M., Mohammad, K., Farahani, F., Alikhani, S., Zare, M., Tehrani, F., et al. (2006). Reproductive knowledge, attitudes and behavior among adolescent males in Tehran, Iran. *International Family Planning Perspectives, 32*(1), 35–44. doi:10.1363/ifpp.32.035.06

Morin, A. J. S., Ahrens, A. K., & Marsh, H. W. (2016). A bifactor exploratory structural equation modeling framework for the identification of distinct sources of construct-relevant psychometric multidimensionality. *Structural Equation Modeling, 23*(1), 116–139. doi:10.1080/10705511.2014.961800

Morin, A. J. S., & Maïano, C. (2011). Cross-validation of the short form of the physical self-inventory (PSI-S) using exploratory structural equation modeling (ESEM). *Psychology of Sport and Exercise, 12*, 540–554. doi:10.1016/j.psychsport.2011.04.003

Mosavi, S. A., Babazadeh, R., Najmabadi, K. M., & Shariati, M. (2014). Assessing Iranian adolescent girls' needs for sexual and reproductive health information. *Journal of Adolescent Health, 55*, 107–113. doi:10.1016/j.jadohealth.2013.11.029

Muthén, L. K., & Muthén, B. O. (1998-2012). *Mplus user's guide* (7th ed.). Los Angeles, CA: Muthén & Muthén.

Muthén, L. K., & Muthén, B. O. (2002). How to use a Monte Carlo study to decide on sample size and determine power. *Structural Equation Modeling, 9*(4), 599–620. doi:10.1207/S15328007SEM0904_8

O'Donnell, L., Myint-U, A., Duran, R., & Stueve, A. (2010). Especially for daughters: Parent education to address alcohol and sex-related risk taking among urban young adolescent girls. *Health Promotion Practice, 11*(S1), 70S–78S. doi:10.1177/1524839909355517

Schinke, S. P., Fang, L., & Cole, K. C. (2009). Computer-delivered, parent-involvement intervention prevent substance use among adolescent girls. *Preventive Medicine, 49*, 429–435. doi:10.1016/j.ypmed.2009.08.001

Schwarz, G. (1978). Estimating the dimension of a model. *The Annals of Statistics, 6*(2), 461–464. doi:10.1214/aos/1176344136

Shirpak, K. R., Ardebili, H. E., Mohammad, K., Maticka-Tyndale, E., Chinichian, M., Ramenzankhani, A., & Fotouhi, A. (2007). Developing and testing a sex education program for the female clients of health centers in Iran. *Sex Education, 7*(4), 333–349. doi:10.1080/14681810701636044

Simbar, M., Tehrani, F. R., & Hasehmi, Z. (2005). Reproductive health knowledge, attitudes and practices of Iranian college students. *Eastern Mediterranean Health Journal, 11*(5/6), 888–897.

Smerecnik, C., Schaalma, H., Gergo, K., Meijer, S., & Poelman, J. (2010). An exploratory study of Muslim adolescents' views on sexuality: Implications for sex education and prevention. *BMC Public Health, 10*, 533. doi:10.1186/1471-2458-10-533

Steiger, J. H., & Lind, J. M. (1980, May). Statistically-based tests for the number of common factors. *Paper presented at Psychometric Society Meeting*, Iowa City, Iowa.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston, MA: Allyn & Bacon.

Tabatabaie, A. (2015). Constructing the ideal Muslim sexual subject: Problematics of school-based sex education in Iran. *Sex Education, 15*(2), 204–216. doi:10.1080/14681811.2014.992066

Tehrani, F. R., & Malek-Afzali, H. (2008). Knowledge, attitudes and practices concerning HIV/AIDS among Iranian at-risk sub-populations. *Eastern Mediterranean Health Journal, 14*(1), 142–156.

Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika, 38*, 1–10. doi:10.1007/BF02291170

Venuti, L. (1998). Strategies of translation. In M. Baker (Ed.), *Encyclopedia of translation studies* (pp. 240–244). London, UK: Routledge.

cogent •• psychology

Cogent Psychology (ISSN: 2331-1908) is published by Cogent OA, part of Taylor & Francis Group.

Publishing with Cogent OA ensures:

- Immediate, universal access to your article on publication
- High visibility and discoverability via the Cogent OA website as well as Taylor & Francis Online
- Download and citation statistics for your article
- Rapid online publication
- Input from, and dialog with, expert editors and editorial boards
- Retention of full copyright of your article
- Guaranteed legacy preservation of your article
- Discounts and waivers for authors in developing regions

Submit your manuscript to a Cogent OA journal at www.CogentOA.com